

# Physiological, Biochemical and Molecular Characterization of a Non-climacteric plum fruit

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## Introduction

Japanese plum (*Prunus salicina* Lindl.) has been categorized as a climacteric fruit, with increases in both ethylene production and respiration rate during ripening. However, we identified a bud sport mutation (Sweet Miriam, SM) from 'Santa Rosa' (SR, climacteric) that performs 'on and off the tree' as a non-climacteric fruit with a high accumulation of sorbitol.

## Results

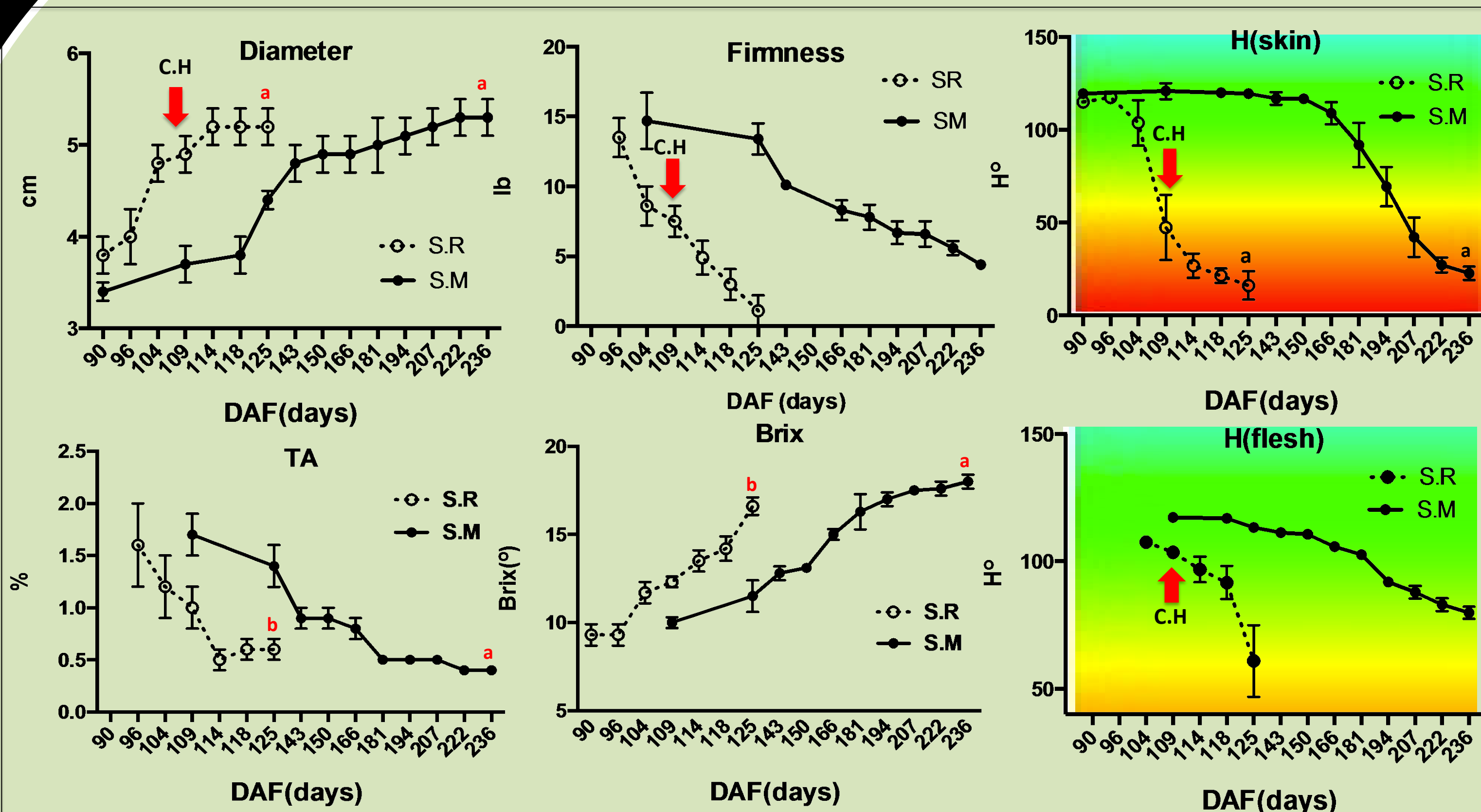


Fig.1. Quality trait evaluation in two cultivars (SR and SM). All the values were expressed by mean  $\pm$  SE, and represented the average of six biological replications.

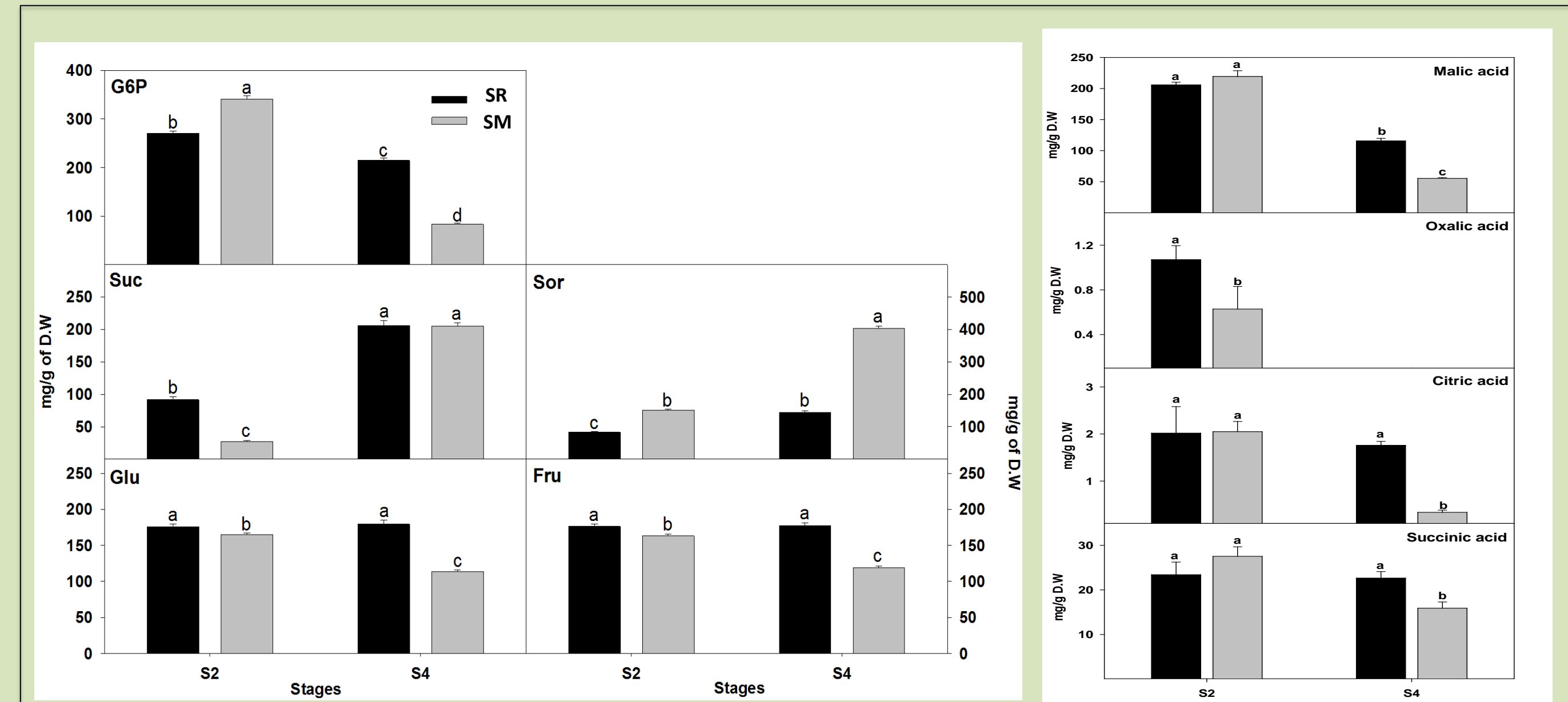


Fig.2. The content of sugars and organic acids in two cultivars (SR and SM) throughout the developmental stages. All the values were expressed by mean  $\pm$  SE, and represented the average of six biological replications.

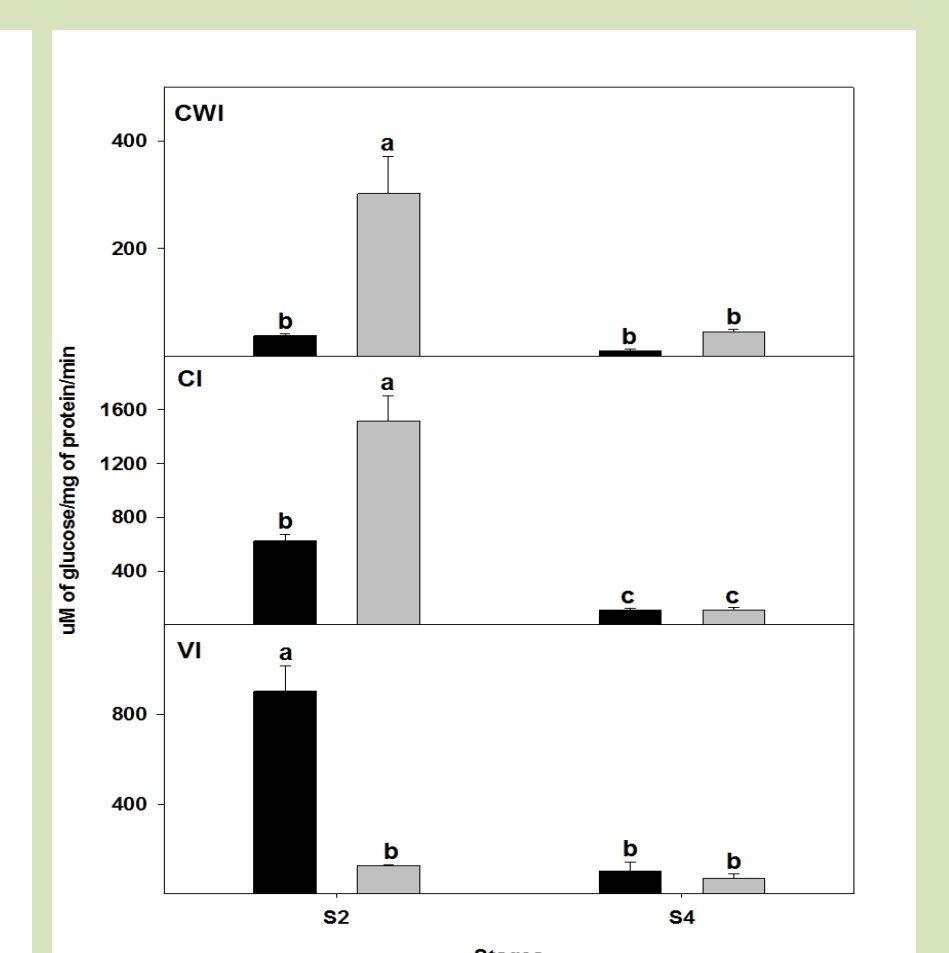
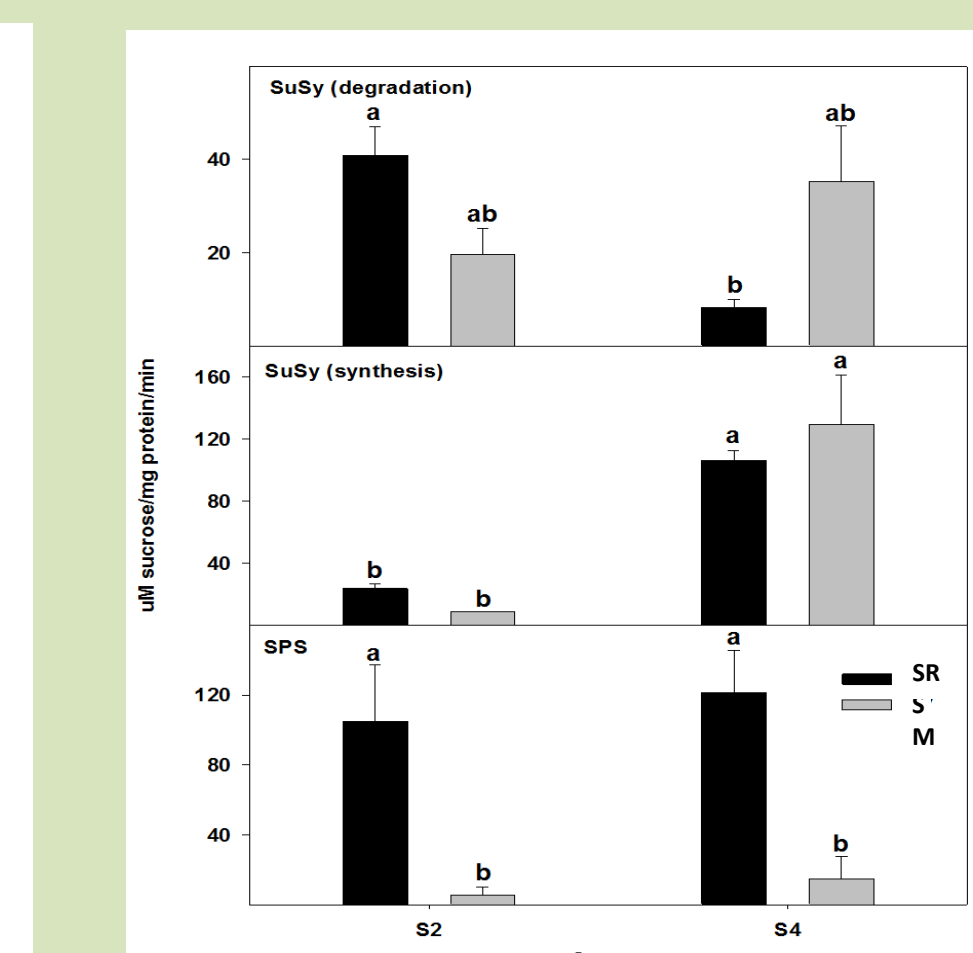
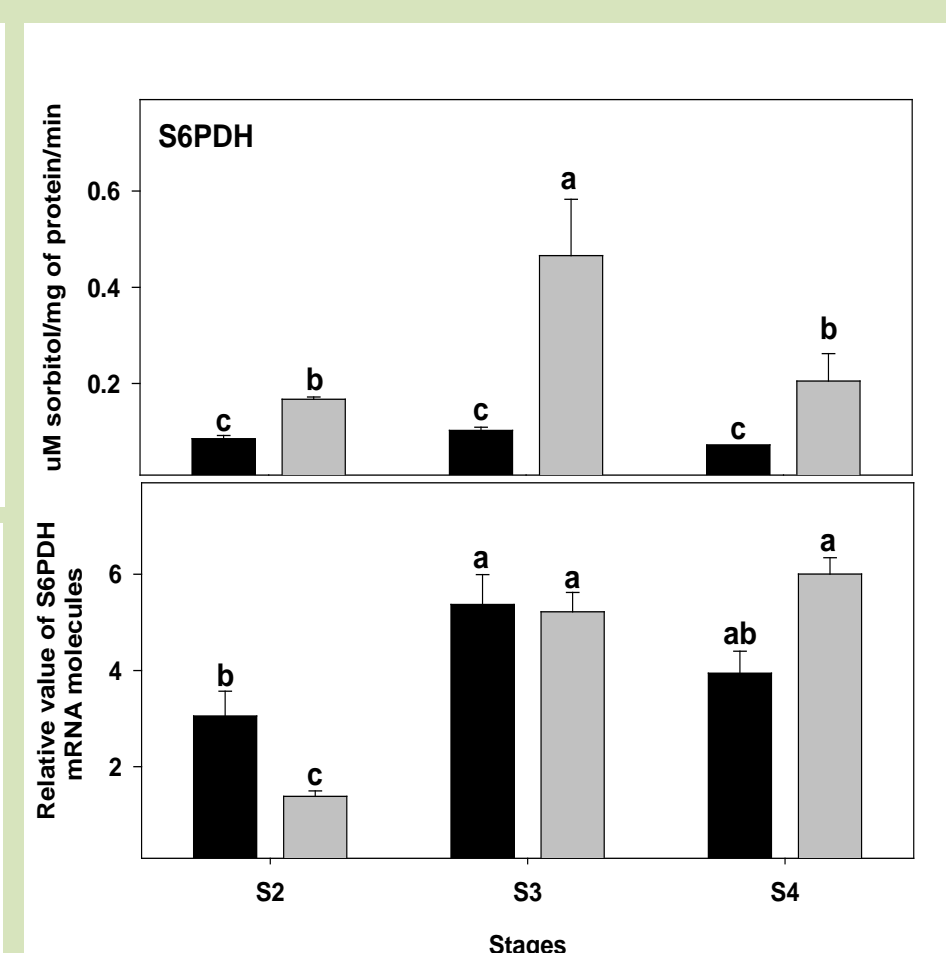
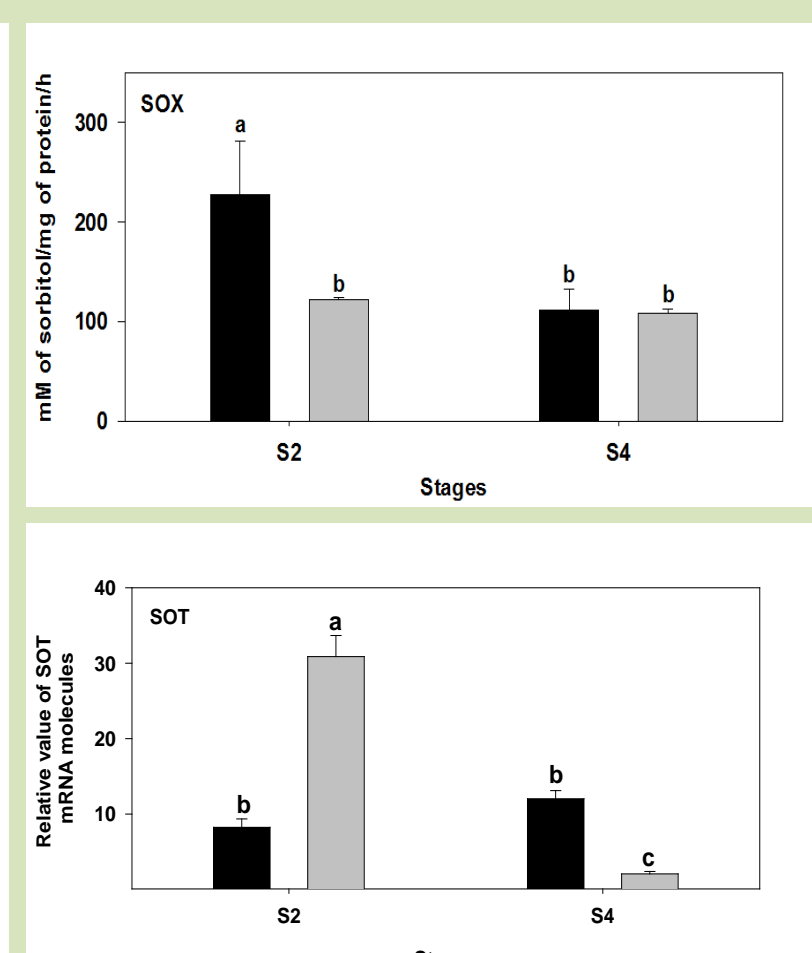
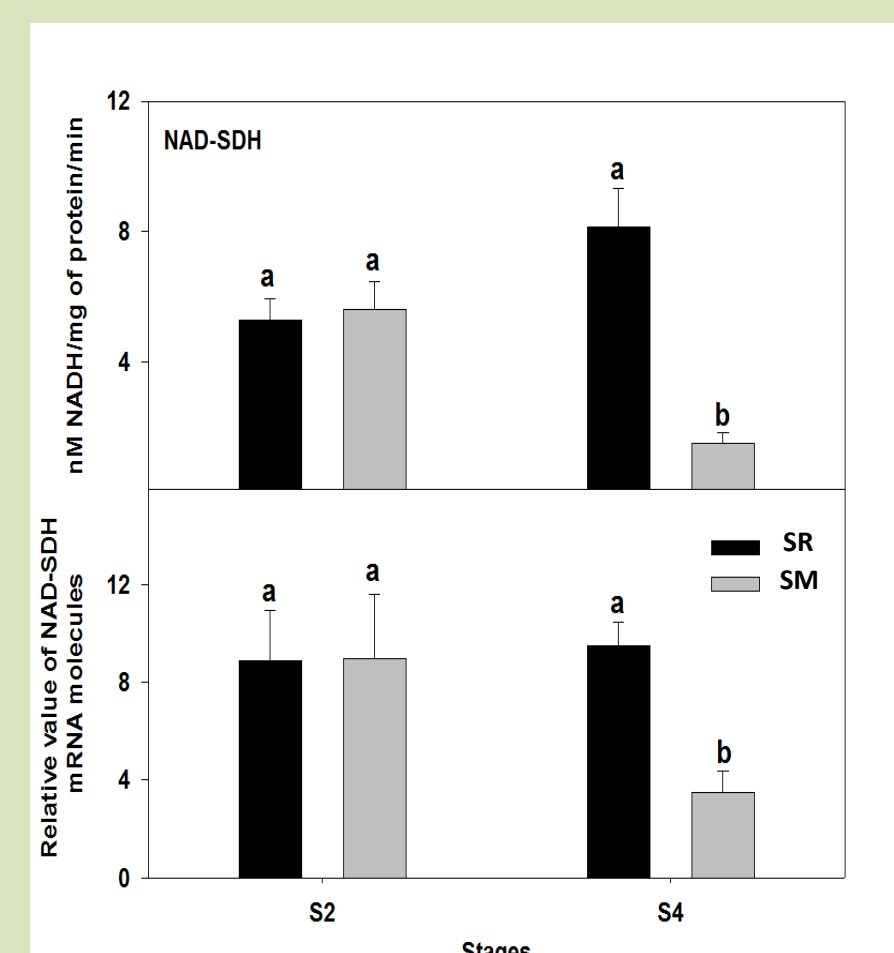
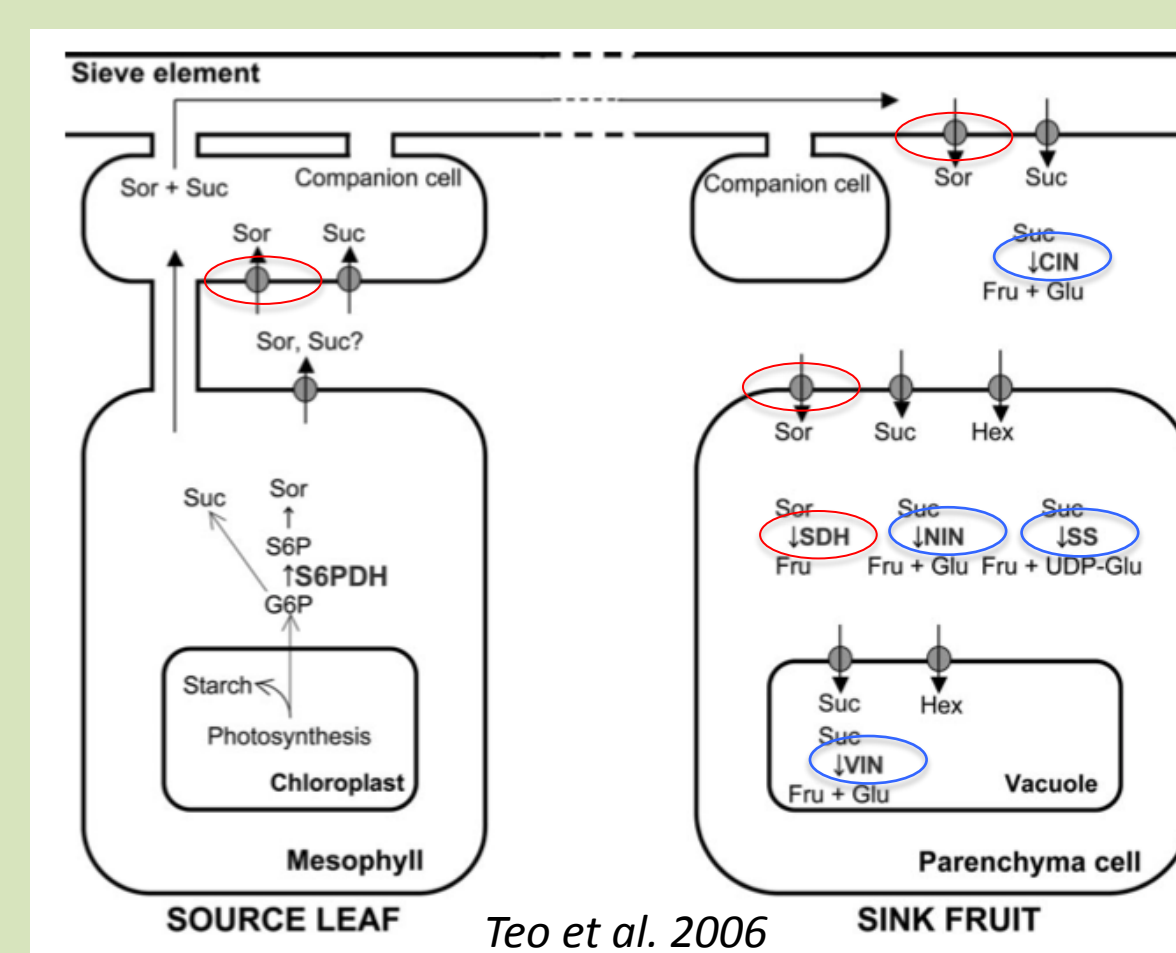


Fig.3. Sugar metabolism and sorbitol metabolism in both cultivars through the developmental stages. All the values represent the average of at least three biological replications.

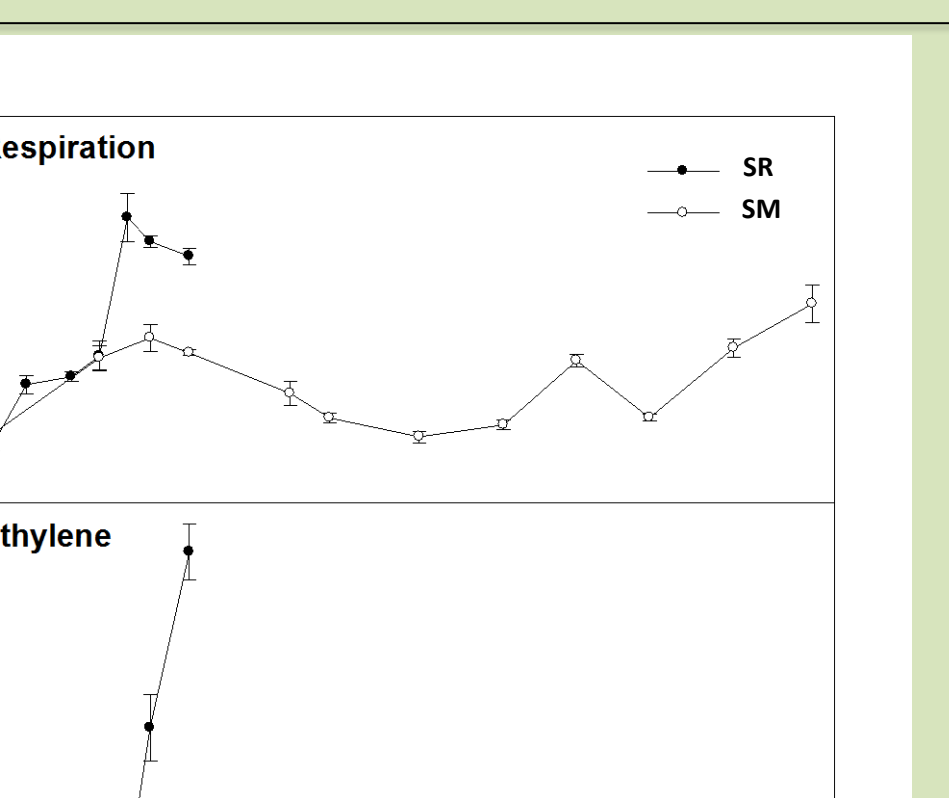
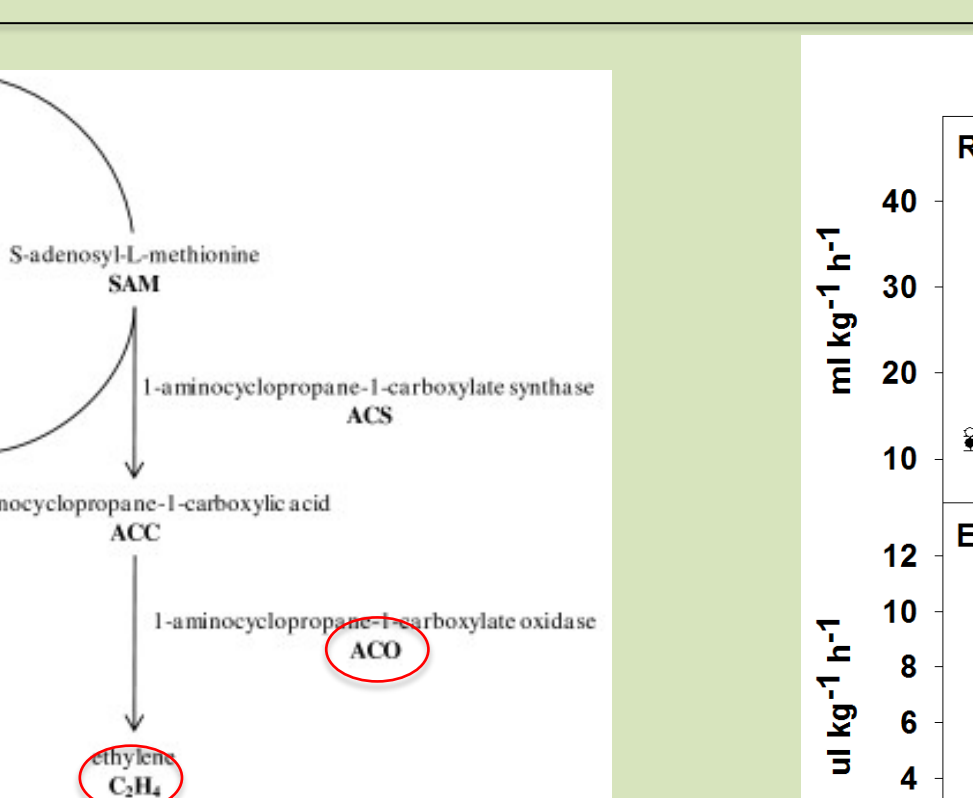
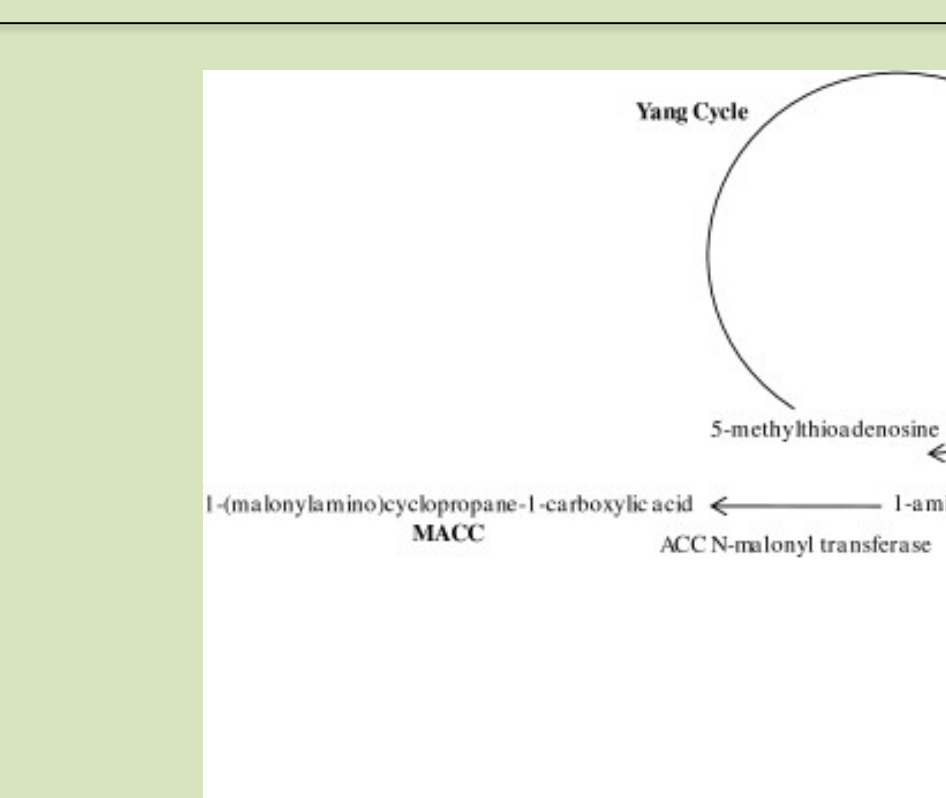
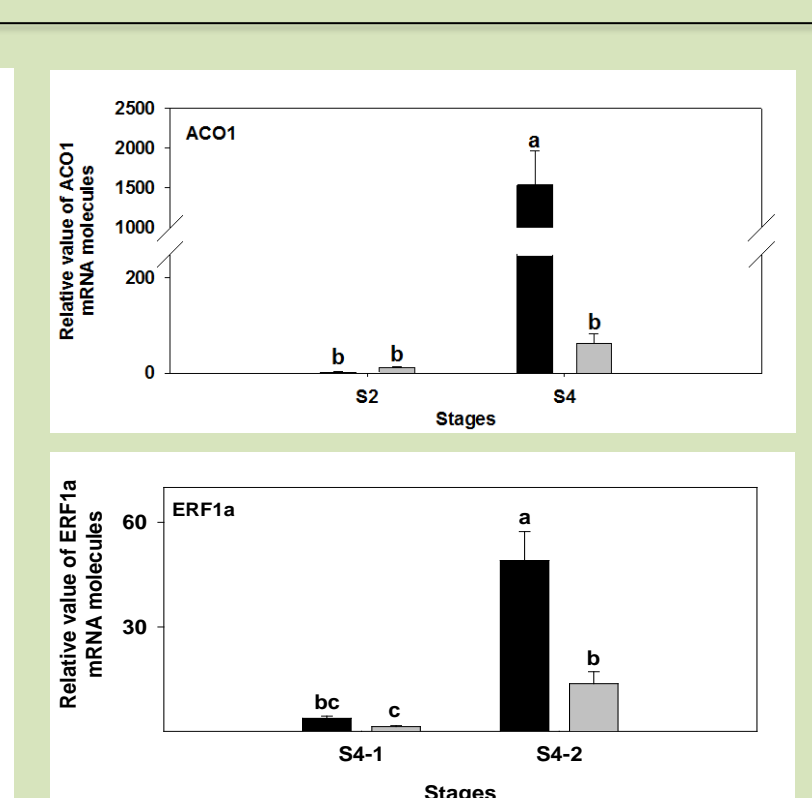
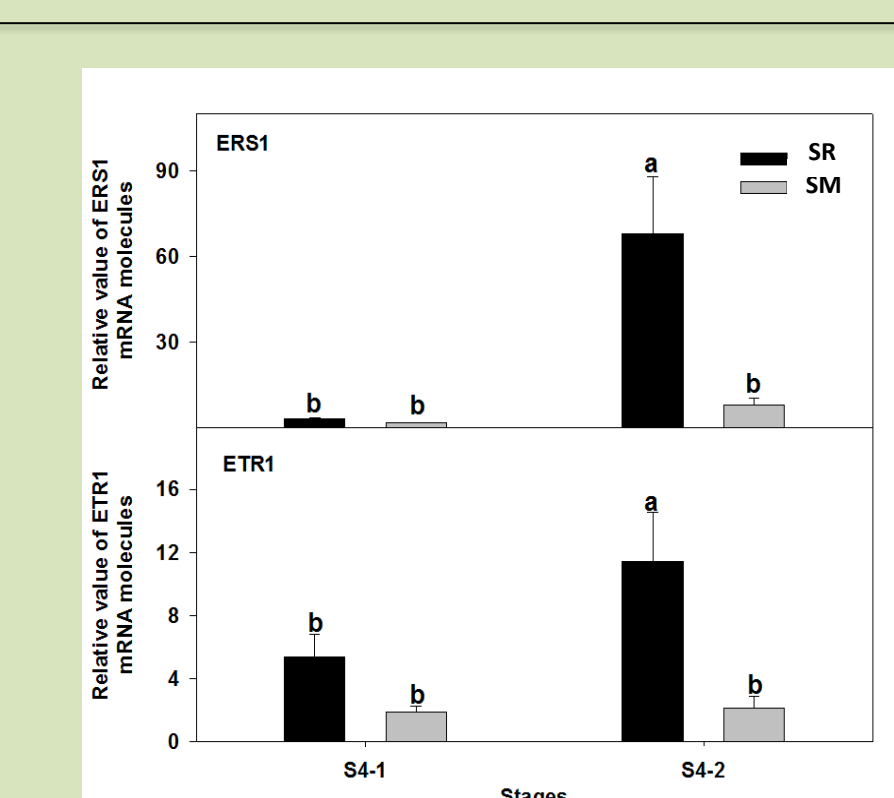
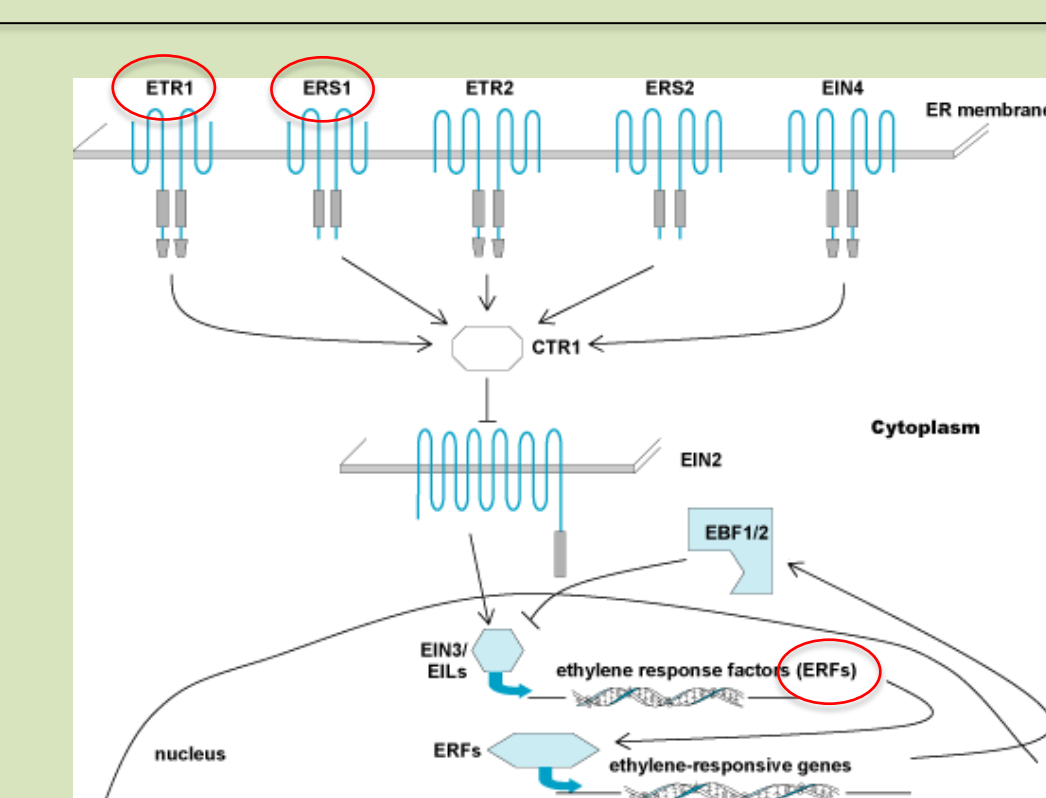
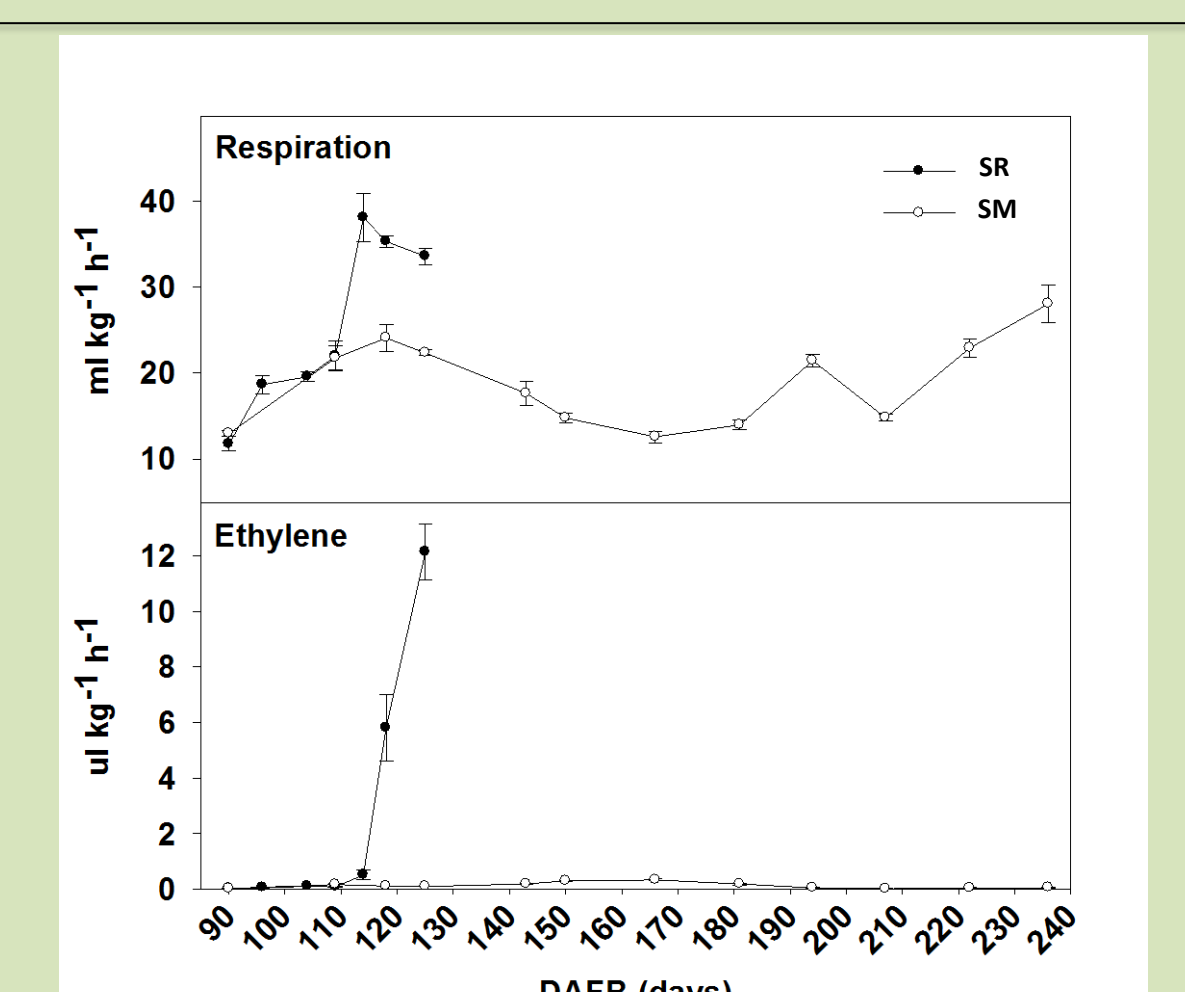


Fig.4. Ethylene content and gene expression of ethylene related genes (ethylene receptor, transcription factor and biosynthesis) in both cultivars (SM and SR) between commercial harvest and fully mature stage



Although the bud sport mutation (SM) showed same weight and diameter at the end of developmental stage compared to 'Santa Rosa (SR)', it exhibited a non-climacteric ripening behavior with ethylene production, respiration, softening and chlorophyll degradation. Soluble solid content (Brix) and titratable acidity were significantly different between SR and SM and it is positively correlated with sugar and organic acid data. Moreover, because of the lack of ethylene production in SM, fruits of bud sport mutation remained firm 'on the tree' for approximately 120 days longer than SR fruit (Fig.1 and 2). Consequently, the sugar metabolism showed quite different patterns, which may cause that high accumulation of sorbitol and less activity and gene expression of degrading enzyme but the relationship between sorbitol metabolism and ethylene metabolism is not confirmed yet (Fig.3). During the ripening process "on" the tree, the expression of ethylene receptors, transcriptional factor and biosynthesis gene were down-regulated in the SM and it makes sense under the lack of ethylene production (Fig.4).

## Conclusion

The breakthrough discovery of these two plum cultivars followed by a molecular analysis of the two different ripening patterns will provide us with new insight into the active role of ethylene or other hormones, and carbohydrate metabolism on climacteric and non-climacteric fruit.

## References

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